AGRICULTURAL ADJUSTMENT ADMINISTRATION

Information File

For

Administrators, Teacher Trainers, and Teachers of Vocational Agriculture

Purpose of Information File:

The purpose of this information file is to provide workers in the field of Vocational Agriculture with information relating to the agricultural situation and the activities of the Agricultural Adjustment Administration, and to furnish suggestions for using such information in giving organized instruction to students in all-day, part-time, and evening school classes in Vocational Agriculture.

Distribution and Organization of Information File:

(*a*) INFORMATION FILE FOLDERS:

This information file folder is furnished to teachers in the field of vocational agriculture to be used in filing inserts prepared especially for the file.

(*b*) INSERTS FOR INFORMATION FILE:

Inserts for the information file will be prepared by or under the direction of the Division of Information of the Agricultural Adjustment Administration. Some of the inserts will be of use to teachers throughout the United States, while other inserts will be prepared particularly to meet the needs of teachers within certain regions.

Cooperation with Office of Education:

This plan of supplying information to the workers in the field of vocational agriculture has been approved by the Agricultural Education Service of the United States Office of Education. A policy is followed of collaborating with the Agricultural Education Service in the preparation of instructional materials.

UNITED STATES DEPARTMENT OF AGRICULTURE, AGRICULTURAL ADJUSTMENT ADMINISTRATION,
DIVISION OF INFORMATION, IN COOPERATION WITH THE UNITED STATES DEPARTMENT OF THE INTERIOR,
Office of Education, Division of Vocational Education, Agricultural Education Service
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VOCATIONAL AGRICULTURE

INSERT CONTENT

Suggestions to teachers and sources of information

Unit 1.—Suggestions to teachers concerning the A. A. A. Information File.

Unit 2.—Important sources of information to be used with the A. A. A. Information File.

INFORMATION

UNIT 1.—SUGGESTIONS TO TEACHERS CONCERNING THE A. A. A. INFORMATION FILE

Purpose of file.—The A. A. A. Information File has been designed primarily as a means of providing teachers of vocational agriculture with an organized system of furnishing information pertaining to the agricultural situation and the activities of the Agricultural Adjustment Administration. Every effort is being made to provide a well-organized system, but the plans cannot be successful unless teachers cooperate in giving attention to certain details of examining and filing the material as it is received.

Filing of inserts.—Each insert will be given a number and date of issue. If a given insert contains more than one important topic, the various topics within the insert will be organized as units with assigned numbers. An insert index form is provided for each file folder, and it is urged that teachers write in on this form the insert number and the insert content as soon as each insert is received. Such a plan, if carried out, will provide teachers with a supply of information indexed for ready reference.

The file folders have been punched with holes for using the no. 22 Acco paper fasteners or fasteners of similar design. For the time being, it will be impossible to furnish inserts which have been appropriately punched, and in consequence teachers must assume the responsibility for this important part of the filing process.

Directions for punching inserts.—Holes, one-fourth inch in diameter, should be punched one-eighth inch from the left margin of the paper.

The top hole should be centered 3⅞ inches from the top of the page.

The bottom hole should be centered 6⅝ inches from the top of the page.

The inserts may be easily marked for punching if a cardboard pattern is made according to the above directions.

If a regular paper punch is not available use a leather punch or a punch from the farm shop.

It may be suggested to teachers that responsible students be put in charge of keeping the file in order.

Filing of material not included in the file.—Many of the inserts for the information file will refer to various publications which have been forwarded to teachers or that are available upon request. It is suggested that each teacher develop a filing system for such related information so that it will be readily available for use in connection with suggestions given in the inserts. If such a plan is adopted, informational material outside of the file can be kept well organized.

UNIT 2.—IMPORTANT SOURCES OF INFORMATION TO BE USED WITH THE A. A. A. INFORMATION FILE

Many of the inserts which are to be prepared for the information file will give directions to teachers for finding and using certain types of information. The information is available to teachers in certain basic publications which all teachers should keep on file for ready reference.

A. Yearbook of Agriculture.—The Yearbook of Agriculture published by the United States Department of Agriculture is a basic reference for statistical information relating to the various phases of agriculture. In the preparation of inserts for the information files, a policy will be followed of referring to tabular information to be found in the current yearbook rather than reproducing in the inserts information which is already available. Teachers should train their students to locate and use the information which is to be found in the yearbooks.

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One or more copies of the Yearbook of Agriculture for school use may usually be secured by writing to the Representative or Senator for the district in which the school is located.

The yearbooks are for sale by the Superintendent of Documents, Washington, D. C. Price, $1 (cloth).

B. Crops and Markets.—Crops and Markets is published monthly by the United States Department of Agriculture. The subscription price is $1 a year, payable to the Superintendent of Documents, Government Printing Office, Washington, D. C.

Teachers have been receiving a free distribution of an abbreviated form of Crops and Markets. It seems advisable to suggest that teachers have school authorities subscribe for this publication in order to obtain the complete editions.

Much of the economic information printed in Crops and Markets will later be printed in the agricultural yearbooks. By using the yearbooks for information covering past years, and Crops and Markets for information which is reasonably up to date, teachers will find that they have rather complete information available.

In order to supplement the latest available yearbook, it is suggested that teachers maintain a file of Crops and Markets about as follows:

(1) Twelve issues, January to December, inclusive, for previous year.

(2) Issues from January 1 to date for current year.

C. The Agricultural Situation.—The Agricultural Situation is issued monthly by the Bureau of Agricultural Economics, United States Department of Agriculture.

The subscription price is 25 cents per year and may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

It is suggested that teachers of vocational agriculture maintain a file of this publication about as follows:

(1) Twelve issues, from January to December, inclusive, for previous year.

(2) Issues from January 1 to date for current year.

D. Statistical Abstract of the United States.—Each year the United States Department of Commerce, Bureau of Foreign and Domestic Commerce, publishes a statistical abstract of the United States. The 1935 Abstract contains 817 statistical tables covering 34 major topics. The publication contains, for example, detailed information relating to the import and export trade of the United States.

To all teachers of vocational agriculture who are interested in having such a valuable source of statistical information at their disposal, it is suggested that a copy of the 1935 Abstract be secured from the Superintendent of Documents, Washington, D. C. Price, $1.50 (buckram).

This publication will be tremendously useful in answering all sorts of questions, providing teachers will examine its contents carefully in order to learn what is available.

If there is some doubt as to the usefulness of such a book, examine a copy at a library before ordering.

E. Additional sources of information.—Information about additional sources of information will be given from time to time in inserts which are to be prepared for the information file.

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VOCATIONAL AGRICULTURE

INSERT CONTENT

Suggestions as to methods for presenting economic information in teaching

INFORMATION

INTRODUCTION

Much economic information relating to agriculture is available in the form of statistical tables and various graphical presentations of such information. The problem confronting teachers is to present such information in a manner which will bring about its most effective use by students of vocational agriculture.

PAPER BLACKBOARD

One of the best methods of presenting economic information to classes in vocational agriculture is to use the blackboard. Many times, however, the regular blackboard space is limited. On account of this lack of space, it is often necessary for teachers to erase from such blackboards material which has been used and to spend considerable time in copying additional material while the class waits. Such a procedure breaks the continuity of instructional procedure and often times classes become restless while waiting for the information to be made ready for use.

Such problems may be overcome by preparing a supply of paper blackboard.

DIRECTIONS FOR MAKING PAPER BLACKBOARD

MATERIALS.

(*a*) Heavy brown wrapping paper.

(*b*) Secure from a school supply concern or a paint company a quart of the best quality blackboard dressing or slating.

(*c*) Good quality paint brush about 4 inches wide.

PROCEDURE.

Paint the wrapping paper with one coat of the blackboard dressing. The material dries rapidly. Within 24 hours such paper blackboard is ready for use.

Before writing upon the blackboard, rub the surface with an eraser with chalk dust on it, in order to cover the black surface with a coating of chalk dust. Clean off this coating with a piece of cheesecloth, and the surface is ready to be used just as any blackboard. It is rather difficult to erase marks from the blackboard unless the surface has first been covered with a light coating of chalk dust.

Such paper blackboard may be hung up by using thumbtacks, or, if smooth wall surfaces are at hand, rubber suction disks equipped with clip holders may be used to good advantage.

PREPARING STATISTICAL TABLES FOR CLASS WORK

Tables in chart size for class work are commonly displayed in complete form, but the most effective method consists in presenting a chart with the most significant portions left out, so that the missing information may be filled in as the ideas relating to the chart are developed. When a complete chart is displayed to a group of students, it is extremely difficult to control attention because persons have a tendency to read the chart for themselves rather than to follow the remarks the teacher may be attempting to make about the chart. When the significant parts of the chart have been omitted, the information has no meaning for the reader. Under such conditions, the teacher can develop the information point by point, filling in the missing information as needed. The paper blackboard can be used to great advantage in such a procedure because the desired number of partial charts may be made in preparation for the class meetings.

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EXAMPLE OF PREPARING A TABLE FOR CLASS USE

The following is a typical example of tabular information to be found in books and bulletins.

TABLE 1.—*Average annual soil and water losses, 1931–33 inclusive, Experiment Station, Bethany, Mo.*[1]

[Shelby silt-loam, 8 percent slope, 33.54 inches mean precipitation]

Item	Soil (tons per acre)	Water (per cent precipitation)
CONTINUOUS		
Corn, plot 1	74.09	24.59
Corn, plot 2	60.80	27.41
ROTATION		
Corn, wheat, clover, plot 3	18.34	13.37
Wheat, clover, corn, plot 4	10.36	10.68
Clover, corn, wheat, plot 5	7.19	11.57
Clover (fertilized), corn, wheat, plot 6	3.74	8.64
Average of plots 3, 4, 5, and 6	9.91	11.06
CONTINUOUS		
Alfalfa, plot 7	.21	3.41
Grass, plot 8	.32	7.74
FALLOW		
Spaded soil, plot 9	112.06	26.02
Spaded subsoil, plot 10	73.47	24.65

[1] Adapted from H. H. Bennett, Dynamic Action of Rains in Relation to Erosion in the Humid Region, Transactions, American Geophysical Union, Fifteenth Annual Meeting, 1934, p. 4.

This table might be put on regular or paper blackboard as follows:

	74.09	24.59
	60.80	27.41
	18.34	13.37
	10.36	10.68
	7.19	11.57
	3.74	8.64
	9.91	11.06
	.21	3.41
	.32	7.74
	112.06	26.02
	73.47	24.65

The table is ready to be filled in as the teacher develops that part of the instruction which calls for the information to be found in the table.

In order to fill in the missing portions of the table without continually referring to a book or bulletin, all that needs to be done by the teacher is to write in the missing information, using an ordinary lead pencil. The pencil marks can be seen with ease by the teacher, while the information cannot be deciphered by members of the class unless they come close to the blackboard. It will be found that the chalk marks can be erased, leaving the pencil marks about as they were before, which means that the chart may be used again without having to rewrite all the information.

Each table selected for use by the teacher needs to be studied to determine the best method of presentation. Sometimes it is best to put in all the headings and the description of items, leaving out the figures, while in other instances the figures may be put in with the other information omitted.

The rule to follow is to omit from the table the material which reveals the most significant facts. Do not make known the important facts until the discussion has reached the point that calls for the revealing of the significant information.

USING THE BLACKBOARD IN PRESENTING GRAPHICAL INFORMATION

LINE GRAPHS.

The paper blackboard is especially well adapted for purposes of presenting line graphs. The graph may be easily drawn upon a piece of paper blackboard with a lead pencil, and then the pencil marks may be traced with chalk.

An effective method of using such graphs is to have everything complete except for the lines, showing the trends which are to be studied. When an approach has been made, or the discussion has reached the proper stage, the teacher can trace the lines which show the trends. When two or more trend lines are a part of the graph, such as is the case with the well-known graph showing the trend of prices received and of prices paid by farmers, colored chalks will be found useful in bringing out the different lines.

Teachers will find such a plan of presenting line graphs rather effective because each phase of the situation may be developed by itself and presented to the group, step by step, as the lines are drawn in. It will be found that the lines can be traced with chalk very rapidly.

BAR GRAPHS.

A good method to follow in presenting bar graphs is to draw the bars upon the blackboard, together with any portion of the data which does not reveal the meaning of the information.

When the appropriate time comes in the development of the discussion for using the bar graph, the meaning of the information may be made clear by labeling the bars as needed to bring out the desired facts.

Much curiosity may be aroused in students if a teacher will study carefully the order in which he plans

to reveal the items in the chart, and if attention is given to formulating questions which will cause students to make possible estimates or venture opinions which can be tested in the light of the information which a teacher has to reveal by labeling the appropriate parts of the chart or charts which are being used in the teaching process.

"Pie" Graphs.

Pie graphs may be effectively presented by drawing the graph upon the blackboard surface, using lead pencil. Trace all the parts of the graph, except the divisions of the "pie." The divisions of the circle can be drawn in as the information which the pie graph contains is needed.

SIMPLE FIXATIVE FOR CHALK

In connection with the paper blackboard, it is often desirable to prepare several incomplete charts for use on numerous occasions. A great advantage would be obtained if the partial charts could be made with chalk lines which would resist erasing, while the information that was filled in when the chart was in use could be erased, leaving the partial chart in its original form for further use. It is also desirable to have chalk lines remain in good condition when it is necessary to roll the paper blackboard charts. Regular chalk lines tend to remain in rather good condition, but there is some tendency for the lines to become blurred and indistinct from the rubbing incident to the rolling of the charts.

The problems concerning the needs for chalk lines which are fixed enough for practical purposes are solved by a most simple and inexpensive process accidentally discovered by a teacher of Birmingham, England.

Procedure.

1. **Stock solution.**—To a small amount of cold water (6 to 8 ounces) add sugar enough to produce a saturated solution. A saturated solution has been obtained when, after vigorous shaking or stirring, there is still a small amount of sugar left in the bottom of the container.

Use cold water, as the crystalline form of the sugar is to be desired rather than the colloidal.

2. **Treatment of chalk.**—Soak a number of sticks of chalk (colored chalk, if desired) in a solution consisting of one part of the stock solution to three parts of water. When the sticks of chalk cease to give off bubbles, remove and drain. In a short time the chalk will be ready for use.

Lines made with chalk treated in this manner will remain upon a blackboard, while lines made from untreated chalk will be erased when a dry eraser or dry cloth is used. If it is desired to erase the lines made by the treated chalk, use a wet cloth.

3. **Preserving treated chalk.**—Sticks of chalk which have been soaked in the fixing solution may be kept in good condition for an indefinite period by storing in an air tight container such as a fruit jar.

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A. A. A. Information File Insert No. 3

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INSERT CONTENT

INFORMATION AND PROCEDURE

UNIT 1.—PLANNING COURSE OF INSTRUCTION AND DEVELOPING PROBLEMS

CONTENTS OF UNIT

A. Introductory statement to teachers.—The materials and procedures in this insert are suggested as guides primarily for teachers of agriculture in the Southern Region in connection with evening class instruction. They may also be used with part-time and all-day groups.

It is not intended that teachers follow the outline step by step, as developed here, but they should use the information in developing complete lesson plans for specific groups of farmers or farm boys.

The organization of factual information under each of the five winter cover crop problems selected for teaching makes it necessary for teachers in the several States to pick out the material most pertinent to the local situation and include such material in the instructions. For example, in this unit all the information considered of great value has been included. Teachers in Georgia, Alabama, and other southeastern States will probably want to use only the facts from South Carolina, North Carolina, Alabama, Virginia, Florida, Mississippi, and Georgia. On the other hand, teachers in the southwestern States will probably choose the data from Oklahoma, Arkansas, and Texas.

It is expected that the conference method or modified conference method of teaching will be used in dealing with these problems.

It is also suggested that teachers reproduce the tables in this insert on to large charts or blackboard. The charts have the advantage of concealing data until the questions have been raised and experiences of the group relative to the problem pulled out, analyzed, and evaluated.

See Insert No. 2 for suggestions on chart making and presentation.

The information in this insert is limited to the major winter cover crop enterprises that are grown in the South for soil conserving and soil building. Data relative to wheat and oats are not included in this outline.

B. Preliminary consideration.—

1. **Objectives of course.**—To develop the requisite abilities of farmers and farm boys to think through and do the jobs involved in successfully growing and turning under winter cover crops.

2. **Provide necessary teaching materials and equipment.**—Charts or chart paper, blackboard, crayon and eraser, one chart stand, lights, and

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comfortable room. The list of bulletins, etc. needed are found in bibliography.

C. Developing a permanent *set* for the class.—

1. ***Importance of developing group set.***—It is a well known fact that reflective thinking takes place only when the individual recognizes a real problem and has some desire to do something about it. So to begin with, the teacher must lead the individuals in the group to see and feel the need for conserving and building the soil through a winter cover cropping program as a part of the farming program.

2. ***Suggestions on how to get group set.***—

a. *Success stories.*—The teacher should make an effort to discover some success story where a farmer or a whole community has made great progress in building up land through a winter cover cropping program. The Nancy Hart School Community in Georgia, where the soil was eroded, farm income low, short school terms, etc., and through the use of crimson clover on a community-wide basis, the soil has become productive, farm income has been greatly increased, 9 months' school, good churches, cooperative spirit improved, etc., is an example. There are stories of this kind in many counties of the South. If the teacher does not know of a story first hand, many have been written up in farm papers and magazine sections of daily papers.

In most every community or county, one or more good farmers, who have been following a winter cover cropping program, will provide the basis for a story. In some cases, get the farmer to tell the story himself.

Success stories usually appeal. Use them to inspire the members of the group to want to succeed with winter crops.

b. *Present facts showing need for soil conservation and soil building crops.*—The teacher should raise such questions with the group as: (1) Do we need winter cover crops on land? (2) How will winter cover crops prevent erosion? (3) Does land planted to winter grain erode as badly as if only planted to summer crops? (4) What are the effects of winter legumes on soil? etc., etc. The farmers should be encouraged to discuss these questions. If there are badly eroded fields in the vicinity of the school, attention should be directed to them; if possible, take the group to see the fields and have them give all the reasons they can think of for these particular fields eroding. One reason suggested will probably be that nothing was planted on the soil during winter months.

Have members of group check their own farms to see if fields with winter cover crops eroded as badly as fields without cover crops.

The need for a winter cover cropping program may be emphasized by presenting the following statements and facts assembled and organized by the Soil Conservation Service, Athens, Ga. Each of the statements should be questioned and farmers encouraged to discuss them.

Dr. Isaiah Bowman, Chairman of the National Research Council, says there is only:

1 fertile acre of land left for each inhabitant in the United States.
1 acre of sheet eroded land.
5 acres of badly gullied and badly washed land.
6 acres in mountain, marsh, and swamp land.

We must conserve the 1 acre and build back up the 6 acres of eroded land.

Between 1920 and 1930 in the Piedmont section of Georgia and the Carolinas, there were 50,000 farms abandoned, largely because of soil erosion.

In one county in the Piedmont section of Georgia (Madison) where a careful survey was made, it was found that in 1889 the average expenditure per acre for fertilizer was 82 cents. This land was planted in corn and cotton for 40 years (1929) when it was found the cost of fertilizer per acre was $3.22.

In 1933 a survey was made by the Department of Rural Organization of the State College of Agriculture and the Soil Erosion Control Service on a number of farms on the Sandy Creek watershed. Sixty-seven dollars was the annual income after expenses were paid. These were submarginal farms that had been run year after year in soil depleting crops.

In Georgia there are 37,568,324 acres. Practically 1,000,000 of this has been rendered unfit for cultivation, because the soil has washed off the hill sides. Another 1,000,000 of our fine bottom lands has been covered up, rendering it unfit for cultivation.

A forest will protect the land practically 100 percent and build soil by shedding leaves, twigs, etc.

Director Hugh H. Bennett of the Soil Conservation Service says that if every acre of cotton land in the South was covered by a winter cover crop, it would increase the value of the land, in soil fertility, more than $5 per acre in 1 year.

An experiment made by one of the Southern Soil Erosion Control Experiment stations (North Carolina), showed that a field with a thick cover of vegetation lost only 5 pounds of soil per acre, while a cultivated field in row crops lost 21 tons per acre.

Farmers' Bulletin No. 579, United States Department of Agriculture, says:

"Crimson clover, when turned under as green manure, on good land, equals about 10 tons per acre. This is equivalent to 8 tons of barnyard manure. Crimson clover adds both humus and nitrogen to the soil. When plowed under as green manure, it increased the yield of corn 7 bushels per acre, sweet potatoes 20 bushels per acre."

Tables 1–7, inclusive, contain data from several of the experiment stations in the South, which show the need for controlling erosion and the advantages of winter cover crops. These tables should be used to answer questions raised.

TABLE 1.—*Effect of various crops on rainfall run-off and soil eroded at West Raleigh, N. C., 1924–27—Slope 9 percent*

Crop	Run-off		Soil erosion	
	Inches	Percentage [2]	Inches	Percentage [2]
Cotton [1]	11.76	88	0.1419	96
Grass	2.16	16	.0030	2
Corn	10.13	76	.0959	65
No crop	13.33	100	.1477	100

[1] Average of four plots.
[2] 100 percent normal erosion when no crop.

References.—North Carolina Bureau of Public Roads, U. S. Department of Agriculture, and North Carolina Experiment Station, Raleigh, N. C. First, second, and third progress report on soil erosion and run-off experiments.

Discuss table 1. Point out the high percentages of run-off and soil erosion where cotton and corn are planted, and the low percentage where grass is grown as a cover crop.

Other selected data from southern experiment stations are given. They may be used to further impress the group on the necessity for planting winter cover crops.

TABLE 2.—*Effect of various crops on rainfall run-off and soil eroded during 1935 at Reidville, Woodruff, and Tigerville, S. C.*

Crop	Percentage run-off	Soil eroded per acre (tons)
Bare	44.63	28.26
Cotton	17.93	17.87
Corn	18.91	6.57
Lespedeza	10.76	1.18
Bermuda grass	1.39	.13

Reference.—South Carolina Experiment Station, Clemson, S. C. Forty-eighth annual report, 1935.

TABLE 3.—*Comparative effects of a 3-year rotation with a continuous crop upon rainfall run-off and soil eroded at Guthrie, Okla., 1930–34*

Crop	Percentage run-off	Soil eroded per acre (tons)
Continuous cotton	15.33	25.47
Rotation:		
Cotton	13.83	15.37
Wheat	14.52	1.72
Sweetclover	8.31	.62
Rotation average	12.22	5.90

Reference.—U. S. Department of Agriculture Soil Erosion Service. Red Plain Erosion Experiment Station, Guthrie, Okla.

TABLE 4.—*Effect of strip cropping on amount of rainfall run-off and soil eroded, Guthrie, Okla., 1934*

Contour crops	Interval crops	Average slope	Percentage run-off	Soil eroded per acre
		Percent	*Percent*	*Tons*
Cotton [1]	Alfalfa	4.50	7.19	0.7138
Do. [1]	Oats [2]	4.00	17.83	1.7787
Cotton		3.50	13.69	3.8520
Oats [3]	Cotton	3.00	17.66	2.2510

[1] 12-row strips.
[2] Oats fallowed by Sudan grass.
[3] 42-foot strips.

Reference.—U. S. Department of Agriculture Soil Erosion Service. Red Plains Erosion Experiment Station, Guthrie, Okla.

TABLE 5.—*Average run-off and erosion losses of land cropped in cotton continuously and permanent bermuda sod, Tyler, Tex., 1932–34*

Crop	Percentage rainfall run-off	Soil eroded per acre (tons)
Continuous cotton	16.76	6.45
Continuous cotton [1]	21.60	31.71
Bermuda sod	.77	.0067

[1] Desurfaced.

Reference.—U. S. Department of Agriculture, Soil Conservation Service-Soil Erosion Experiment Station No. 4, Tyler, Tex. Outline of investigational work in progress and brief summary of principal results.

TABLE 6.—*Effects of various crops on amount of rainfall run-off and soil eroded at Columbia, Mo., 1917–31*

Crop	Percentage rainfall run-off per acre	Surface inches eroded	Soil eroded per acre per year (tons)	Years to erode 7 inches
No crop [1]	[2] 48.9	[2] 1.454	[2] 34.5	[2] 29
No crop [3]	30.7	1.731	41.6	24
No crop [4]	30.3	1.499	41.0	28
Blue grass	12.0	.011	.3	3,547
Wheat	23.3	.279	10.1	150
Corn, wheat, clover [5]	13.8	.096	2.7	437
Corn	29.4	.745	19.7	56

[1] Uncultivated, weeds pulled.
[2] 1917 to 1923.
[3] Spaded 4 inches.
[4] Spaded 8 inches.
[5] 3-year rotation.

Reference.—Missouri Agricultural Experiment Station, Columbia, Mo. Bul. 63 and 177.

TABLE 7.—*Effects of various crops on rainfall run-off and soil eroded at Tyler, Tex., 1931–34*

Crop	Treatment	Percentage rainfall run-off	Soil eroded per acre
			Tons
Continuous cotton	No fertilizer	19.52	19.08
Do	Fertilizer	18.44	17.94
Cotton	Rotation with oats	17.00	15.01
Corn	Winter cover crop	19.60	15.01
Lespedeza	do	16.32	13.18
Cotton [1]	Desurfaced, fertilized	25.24	48.95
Cotton	do	23.29	63.47
Do	Desurfaced, no fertilizer	24.48	65.30
Bermuda sod		1.35	.18
Bare fallow		17.20	10.27

[1] Oats, winter cover crop.

Reference.—U. S. Department of Agriculture Soil Conservation Service, Soill Erosion Experiment Station, Tyler, Tex., 1931–34. Outlines of investigational work in progress and brief summary of principal results.

When the above tables are placed on chart or blackboard, space should be left for another column of figures. The farmers should be encouraged to estimate the value of soil losses in tons and these figures placed in the column.

Lead each member of group, on basis of above tables, to estimate the number of tons and value of soil eroded each year on the farms represented in the class.

H. H. Bennett, of United States Department of Agriculture Soil Conservation Service, says:

A recent reconnaissance survey of the extent of soil erosion in this country showed that approximately 50,000,000 acres of once fertile land has been essentially ruined for practical cultivation. Another 50,000,000 acres is in a condition almost as serious. About 100,000,000 acres still in cultivation has been seriously impoverished by the loss of soil; and about 100,000,000 acres more of cultivated land is being depleted of productive soil at an alarming rate.

The 3 billion tons of soil wasted from our fields each year contain 92,172,300 tons of the five principal elements of plant food (phosphorus, potassium, nitrogen, calcium, and magnesium), as computed from the average of analyses of 389 samples of surface soil collected by the Bureau of Chemistry and Soils throughout the country (1.55 percent potash, 0.15 percent phosphoric acid, 0.10 percent nitrogen, 1.56 percent lime, and 0.84 percent magnesia). Of this total, 43,561,000 tons consist of phosphorus, potassium, and nitrogen, the principal ingredients of commercial fertilizer. According to estimates of the American Fertilizer Association, approximately 668,000 tons of phosphorus, potassium, and nitrogen were used in the United States during the fiscal year ending June 30, 1934. The same authority estimates the value of commercial fertilizers sold in the United States during the calendar year 1934 at $158,500,000.

NOTE.—Address before the forty-first annual session, Illinois Farmers Institute, Belleville, Ill., February 20, 1936.

At this point, the teacher should raise the question as to the extent of erosion in the county and State. According to Glenn L. Fuller of the Soil Conservation Service of the United States Department of Agriculture, reconnaissance soil erosion maps have been made for all Southern Region States and are available at the several State soil conservation offices. These maps should be procured along with the type data listed below and presented to the group as a basis for discussion.

Results of the Alabama survey are as follows:

	Acres	Percent
1. Total area (exclusive of large cities and water)	32,913,588	100.0
2. Areas with little or no erosion	5,616,851	17.1
3. Total area affected by sheet erosion	25,423,120	77.2
(*a*) One-fourth to three-fourths topsoil lost	*17,182,166*	*52.2*
(*b*) Over three-fourths topsoil and some subsoil lost	*8,240,954*	*25.0*
4. Total area affected by gullying	22,861,601	69.5
(*a*) Occasional gullies	*19,908,692*	*60.5*
(*b*) Severe gullying	*2,947,728*	*9.0*
(*c*) Destroyed by gullies	*5,181*	

Following the discussion of State reconnaissance map and State data the following table should be filled out for the farms represented in the class:

Name or number	Total area of farm	Areas with little erosion	Sheet erosion		Gullying		
			¼ to ¾ topsoil lost	Over ¾ topsoil lost	Occasional gullies	Severe gullying	Destroyed by gullies

Make comparisons of the data from the farms of the class and the State as a whole. (NOTE.—This study may create a desire on the part of class members to make a soil map of the farms represented. See bulletin published at Clemson College, Clemson, S. C., vol. 12, Agricultural Education, for suggestions to teach this problem.)

At this point, the teacher should ask, "What are some methods that are practical to use in stopping erosion and building up our soils?" The group will probably suggest (1) Terracing land, (2) strip cropping, (3) deeper plowing, (4) summer cover crops, (5) winter cover crops, etc. These should be placed on the board as they are suggested. Which of these can we do something about this fall? Someone will probably suggest winter cover crops.

When winter cover cropping is suggested as a means of controlling erosion and building soil, the group should be led to suggest the following prob-

lems that must be solved if winter cover cropping is to succeed: (1) Procuring winter cover crop seed, (2) planting winter cover crops, (3) fertilizing winter cover crops, (4) inoculating winter cover crops, and (5) turning under winter cover crops. The other units in this insert deal with the five problems listed above.

D. Bibliography for all units in Insert 3.—

1. **Important references.**—The teacher according to his location should procure at least one copy of the bulletins listed below several days prior to the opening of the class. The bulletins will supply much supplementary information relative to the data in this insert. For example, the teacher should know the conditions under which the experiment was conducted, years experiment was run, soil type, etc.

ALABAMA

(1) Alabama Agricultural Experiment Station, Auburn, Ala. Bulletin 232.
(2) Alabama Extension Service, Auburn, Ala. The Digest, volume 7, nos. 3 and 4.

FLORIDA

(1) Florida Agricultural Experiment Station, Gainesville, Fla. Annual Report 1930.

GEORGIA

(1) Georgia Coastal Plain Experiment Station, Tifton, Ga. Bulletin 23.
(2) Georgia Experiment Station, Experiment, Ga. Bulletin 146. Annual Reports for 1929, 1930, and 1935. Unpublished data on winter cover crops, 1936.
(3) University of Georgia, College of Agriculture, Athens, Ga. Bulletin 10–b.

LOUISIANA

(1) Louisiana Experiment Station, Baton Rouge, La. Bulletin 155 and unpublished data on winter legumes, 1936.
(2) Northeast Louisiana Experiment Station, St. Joseph, La. Unpublished data on winter legumes, 1936.

MISSISSIPPI

(1) Mississippi Agricultural Experiment Station, State College, Miss. Bulletins 303, 309, and Annual Report 1931.

NORTH CAROLINA

(1) North Carolina Bureau of Public Roads, United States Department of Agriculture, and North Carolina Experiment Station, Raleigh, N. C. First, second, and third progress report on soil erosion; also circular 178.

OKLAHOMA

(1) United States Soil Conservation Service, Soil Erosion Experiment Station, Guthrie, Okla. Outline of Investigations and Summary of Results, 1930–35.

SOUTH CAROLINA

(1) South Carolina Agricultural Experiment Station, Clemson College, S. C. Circular no. 37, and forty-eighth Annual Report, 1935.

TENNESSEE

(1) Tennessee Agricultural Experiment Station, Knoxville, Tenn. Bulletin 142 and circulars 45 and 52.

TEXAS

(1) United States Soil Conservation Service, Soil Erosion Experiment Station No. 4, Tyler, Tex. Outline of investigational work started; a brief summary of principal results.

VIRGINIA

(1) Virginia Experiment Station, Blacksburg, Va. Bulletin 292.

OTHERS

(1) Missouri Agricultural Experiment Station, Columbia, Mo. Bulletins 63, 177, and 282.
(2) United States Department of Agriculture, Washington, D. C. Bulletin 579.
(3) Agricultural Adjustment Administration, Washington, D. C. Agricultural Conservation Program 1936. S. R. bulletins no. 1, revised, no. 2, no. 3, and S. R. leaflet no. 2. (Secure the latest revised editions of these publications from local authorities.)
(4) State Soil Conservation Service. (In most States, these are located at the State college of agriculture.) Reconnaissance map and State data on soil erosion.
(5) United States Department of Agriculture, Agricultural Adjustment Administration, Washington, D. C. Soil Conservation: Its Place in National Agricultural Policy, May 1936, G–54.
(6) United States Department of Agriculture, Agricultural Adjustment Administration, Southern Division. (NOTE.—The Southern Division is preparing a publication which will contain pertinent data on winter cover crops from experiment stations in the South. The publication will be in mimeographed or printed form, and will probably be sent to teachers of vocational agriculture in the South by early fall.)

2. OTHER REFERENCES

(1) Mississippi Agricultural Experiment Station, State College, Miss. Press circular no. 415, circular no. 74, circular no. 9, Annual Report of Holly Springs Branch Station 1931, and bulletin no. 63 and no. 296.
(2) Virginia Agricultural Experiment Station, Blacksburg, Va. Bulletin 168.

(3) Arkansas Agricultural Experiment Station, Fayetteville, Ark. Annual Report 1932.
(4) Oklahoma Agricultural Experiment Station, Stillwater, Okla. Annual Report 1932.
(5) North Carolina Agricultural Experiment Station, Raleigh, N. C. Annual Report 1931.
(6) United States Department of Agriculture, Washington, D. C. Technical bulletin no. 367.
(7) Georgia Coastal Plain Experiment Station, Tifton, Ga. Bulletin 24.
(8) Georgia Experiment Station, Experiment, Ga. Bulletin 149.
(9) South Carolina Agricultural Experiment Station, Clemson, S. C. Forty-second Annual Report 1929.
(10) West Virginia Agricultural Experiment Station, Morgantown, W. Va. Bulletin 105.

UNIT 2.—PROCURING WINTER COVER CROP SEED

In order to procure the best winter cover crop seed, careful consideration should be given to the experiences of the farmers of the community, as well as all available experimental data. If the group has concluded in Unit 1 that winter cover crops should be used to prevent erosion and build soil, the appropriate question to ask the group is:

What kind of winter cover crop to grow?

(a) What kind of winter cover crops have been found best by members of the group?

TABLE 1

Name	Kind of winter cover crop	Date of turning under	Cost of seed	Other costs	Yield	Estimated yield of following crop	Estimated net returns

The experiences of the group should be obtained and tabulated as suggested in table 1. A thorough discussion of these data should follow. From the table, what conclusion may be reached? This discussion will probably lead the group to want more information before making a decision.

(b) What winter cover crops have been found best by the farmers of the community who have successfully grown cover crops?

The teacher or some member of the group should get the information from these farmers and place it on the board, using same form as table 1.

(c) What winter cover crops are classed as soil conserving crops in Southern Region?

Below are the enterprises approved for the 1936 agricultural conservation program. S. R., leaflet 2.

N. B.—Teachers should be sure to check the following information with the latest revised publications for any changes which may have been made.

Annual winter legumes, including vetch, winter peas, bur and crimson clover; biennial legumes, including sweet and alsike clover; perennial legumes, including alfalfa, kudzu, and sericea; summer legumes, including soybeans (except when produced for seed for crushing), velvetbeans, crotalaria, cowpeas; and annual varieties of lespedeza.

Peanuts, when pastured.

Perennial grasses, including dallis, redtop, orchard, Bermuda, carpet or grass mixtures, also Sudan grass.

Winter cover crops, including rye, barley, oats, and grain mixtures, winter pastured or not, if turned as green manure, or if harvested and followed by summer legumes.

Forest trees, if planted on cropland since January 1, 1934.

The list of approved conserving crops should be placed on the board. How many of those approved have been grown in community? What new ones should be introduced as winter cover crops?

(d) For what winter cover crop practices are Government grants made?

The following information from agricultural conservation program, Southern Region, S. R. bulletin 2, should be placed on a chart or blackboard for discussion.

The soil-building practices and rates and conditions of payment as set forth herein shall be applicable to each State in the Southern Region.

Practice	Rates and conditions
PART I. SEEDINGS	
Group 1: Alfalfa, sericea, and kudzu.	$2 per acre, when seeded on cropland between Jan. 1, 1936, and Oct. 31, 1936, inclusive.
Group 2: Red clover, mammoth clover, sweet clover, and annual lespedeza.	$1.50 per acre, when seeded on cropland between Jan. 1, 1936, and Oct. 31, 1936, inclusive.
Group 3: Alsike, white, bur, and crimson clover, Austrian winter peas, vetch and other locally adapted winter legumes. Legume mixtures.	$1 per acre, when seeded on cropland between Jan. 1, 1936, and Oct. 31, 1936, inclusive.

Practice	Rates and conditions
PART II. USE	
Group 1: Soybeans, velvet beans, cowpeas, crotalaria, beggar weed, and other locally adapted summer legumes.	$1.50 per acre, if grown on cropland in 1936 and vines or stalk left on land and seed not harvested for oil-mill crushing, or $2 per acre if plowed under green.
Group 2: Crimson clover, bur clover, Austrian winter peas, vetch, and other locally adapted winter legumes.	$1.50 per acre, when turned under between Jan. 1, 1936, and Oct. 31, 1936.
Group 3: Rye, oats, barley, Italian rye grass, wheat, or mixtures of these.	$1 per acre, when turned under as green manure after making reasonable growth (not less than 2 months' growth) in the spring of 1936, provided that such crops have not gone through the dough stage.
Group 4: Any sorghum, Sudan grass, or millet, seeded solid or broadcast.	$1 per acre, when seeded between Jan. 1, 1936, and July 31, 1936, and all the crop is left on the land or plowed under.
PART III. OTHER	
1. Establishment of permanent pasture. Perennial grasses or grass and legume mixtures.	$2 per acre, if established on cropland between Jan. 1, 1936, and Oct. 31, 1936.
2. Planting of forest trees, including post-producing species.	$5 per acre, if planted on cropland or pasture land between Sept. 1, 1935, and Oct. 31, 1936.

(e) What winter cover crops have been found best by experiment stations?

Data from several experiment stations are given in tables 2–19, inclusive. Teachers should select experiments that have been conducted under similar soil and climatic conditions to those existing in the local community.

TABLE 2.—*Effect of specific winter legumes, turned under, on following cotton crops. Raymond, Miss., 1928–34*

Crop	Yield per acre, seed cotton, 6-year average	Increase yield	Value of increase at 4 cents per pound	Estimated cost of seeding	Estimated net returns
None	846				
Hairy vetch	1,160	314	12.56		
Monantha vetch	1,026	180	7.20		
Bur clover	930	84	3.36		
Crimson clover	862	16	.64		
Austrian peas	926	80	3.20		

Reference.—Mississippi Agricultural Experiment Station. Bulletin 309.

Have farmers estimate cost of seed, inoculation, labor, etc., for each crop, and then fill out column on net returns as indicated in table 2. If the teacher makes these estimates and fills out the chart prior to the meeting, a bar graph showing net returns may also be made. Use same general procedure with other tables.

TABLE 3.—*Effects of winter cover crops on corn yields. Mississippi 5-year average*

Cover crop	Average yield, bushels	Increased yield	Value of increase	Cost of cover crop	Estimated net returns
None, check	30.3				
Vetch	35.6	5.3			
Crimson clover	33.5	3.2			
Rye	29.9	−.4			

Reference.—Mississippi Agricultural Experiment Station, State College, Miss. Bul. 303, p. 14.

TABLE 4.—*Effect of winter cover crops and commercial fertilizer on yields of cotton. Mississippi*

Cover crop	Yield in pounds, seed cotton		Value of increase		Estimated cost	Estimated net returns
	No fertilizer	600 pounds 6–8–4	No fertilizer	Fertilizer		
Check	297	793				
Austrian peas	358	883				
Vetch	409	861				
Rye	394	861				
Check plus 8 tons manure	861	1,108				
Oats	337	867				
Check plus 8 tons manure	1,018	1,201				

Reference.—South Mississippi Branch Experiment Station. Annual Report, 1931, p. 1.

TABLE 5.—*Effect of winter cover crops on yield of cotton and corn. Tifton, Ga., 1926–33*

COTTON

Crop	8-year average yield-seed cotton		Estimated value of increase, at 4 cents		Estimated cost		Estimated net returns	
	Without ammonia	With ammonia	Without ammonia	With ammonia	Without ammonia	With ammonia	Without ammonia	With ammonia
Without green manure	744	1,018						
Austrian peas	1,346	1,331	24.08	12.52				
Monantha vetch	1,166	1,441	16.88	16.92				
Hairy vetch	1,140	1,391	15.84	14.92				
Abruzzi rye	1,037	1,305	11.72	11.48				

CORN

	Bushel	*Bushel*	*75 cents bushel*	*75 cents bushel*				
Without green manure	37.6	39.7	14.17	9.75				
Austrian peas	56.5	52.7	9.30	9.60				
Monantha vetch	50.0	52.5	7.57	8.55				
Hairy vetch	47.7	51.1	−2.39	−.67				
Abruzzi Rye	34.4	38.8						

Reference.—Coastal Plain Experiment Station, Tifton, Ga. Bulletin 23.

TABLE 6.—*Comparative effects of various cover crops with nitrate of soda and with no cover crop on the yield of succeeding crops of corn. Virginia, 1924–29*

Cover crop	6-year average corn—bushel	Increase yield, bushel	Value of increase [2]	Cost [3]	Estimated net returns
None	21.1				
None—Nitrate of soda [1]	35.3	14.2			
Cowpeas	26.6	5.5			
Soybeans	30.9	9.8			
Crimson clover	35.8	14.7			
Vetch	37.5	16.4			
Red clover	34.2	13.1			
Sweet clover	28.8	7.7			
Rye	17.9	−3.2			
Buckwheat	12.8	−8.3			

[1] Top dressing of 100 pounds of nitrate of soda per acre.
[2] Use local price of corn.
[3] Include all costs.

Reference.—Virginia Experiment Station, Blacksburg, Va. Bulletin 292.

TABLE 7.—*Effects of winter cover crops, with and without side dressing, on the yields of corn. Clemson College, S. C., 1926–28*

Preceding crop	Yield		Total value of yield		Estimated cost		Estimated net returns	
	No side dressing	Side dressing	No side dressing	Side dressing	No side dressing	Side dressing	No side dressing	Side dressing
Rye	5.3	13.8						
Rye and vetch	21.1	24.2						
Vetch	18.5	25.7						
Austrian peas	25.3	27.3						
Crimson clover	19.6	21.9						

Reference.—South Carolina Experiment Station. Circular 37.

TABLE 8.—*Yields, per acre, of several varieties of peas and vetches cut at different dates. Tifton, Ga., 1931–33*

Variety	Average yield per acre—pounds			
	Cut Mar. 15		Cut Apr. 15	
	Green weight	Dry weight	Green weight	Dry weight
Austrian winter peas	3,335	601	3,590	775
Kaiser peas	2,629	494	3,880	764
Tangier peas	3,513	645	3,653	682
Hairy vetch	5,566	1,215	8,914	1,830
Smooth vetch	3,519	815	8,480	1,702
Monantha vetch	7,267	1,263	13,206	2,199
Purple vetch	2,434	652	3,640	890
Hairy vetch (19916, selection)	4,940	1,544	7,830	1,918
Hairy vetch (19915, selection)	8,049	2,133	10,969	2,686

Reference.—Coastal Plain Experiment Station, Tifton, Ga. Bulletin 23.

TABLE 9.—*Effects of vetch and commercial nitrogen on yields of cotton. Experiment, Ga., 1928–30*

Treatment	Yield seed cotton	Value seed cotton	Cost of treatment	Estimated net returns
No vetch, 32 pounds nitrogen	1,042			
Vetch, no nitrogen	1,009			
Vetch, 16 pounds nitrogen	1,042			
Vetch, 32 pounds nitrogen	989			

Reference.—Georgia Experiment Station, Experiment, Ga. Annual Report, 1930, p. 18.

TABLE 10.—*Effects of winter cover crops on yields of seed cotton, Georgia, 1928–34*

Treatment	Yield, seed cotton (pounds)	Increased yield	Value of increase	Cost	Estimated net returns
No cover crop, 100 pounds nitrate of soda	948				
No cover crop, 200 pounds nitrate of soda	1,137	189			
Cover crop, no soda	1,024	76			
Cover crop, 100 pounds nitrate of soda	1,127	179			
Cover crop, 200 pounds nitrate of soda	1,076	128			

Reference.—Georgia Experiment Station, Experiment, Ga. Annual Report, 1935, p. 14.

TABLE 11.—*Pounds of nitrogen produced by different winter cover crops, Georgia*

Crop	Nitrogen per acre	Value of nitrogen	Cost of crop	Estimated net returns
Hairy vetch	100			
Monantha vetch	100			
Hungarian vetch	95			
Austrian peas	87			
Crimson clover [1]	74			
Augusta vetch	54			

[1] Poor stand.

Reference.—Georgia Experiment Station, Experiment, Ga. Annual Report, 1929, p. 13.

TABLE 12.—*Yield of winter cover crops at Experiment, Ga., 1928–33*

Crop	Yield (pounds)		Value		Total value	Cost of crop	Estimated net returns
	Dry hay	Nitrogen	Dry hay	Nitrogen			
Austrian peas	3,073	90					
Hairy vetch	3,809	141					
Monantha vetch	4,110	119					
Crimson clover	2,455	67					
Hairy vetch and rye	2,663	64					
Austrian peas and oats	1,761	39					

Reference.—Georgia Experiment Station, Experiment, Ga. Unpublished data.

TABLE 13.—*Number of pounds of nitrogen produced and yields of corn following winter cover crops. Georgia, 1929–30*

Crop	Yield		Value		Total value	Cost of cover crop	Estimated net returns
	Nitrogen	Corn, bushels	Nitrogen	Corn			
None	0	30.9					
Austrian peas	182	28.5					
Hairy vetch	260	31.7					
Hungarian vetch	121	26.6					
Monantha vetch	176	27.9					
Smooth vetch	209	30.3					
Crimson clover	105	30.8					

Reference.—Georgia Experiment Station, Experiment, Ga. Unpublished data.

TABLE 14.—*Effects of winter cover crops on yields of corn. Georgia, 1931*

Crop turned under	Yield, corn, bushels	Value of corn	Cost of cover crop	Estimated net returns
No legume	9.5			
Hairy vetch	7.8			
Hairy vetch and Abruzzi rye	6.7			
Austrian peas	10.5			
Austrian peas and oats	11.1			
Monantha vetch	7.4			
Crimson clover	9.5			

Reference.—Georgia Experiment Station, Experiment, Ga. Unpublished data.

TABLE 15.—*Cold injury to winter legumes in 1927–28 when temperature was 1° F. Experiment, Ga.*

Crop	Percent killed
Austrian peas	0
Hairy vetch	0
Hungarian vetch	0
Augusta vetch planted on level land	31
Augusta vetch planted in furrows	6
Monantha vetch planted on level land	89
Monantha vetch planted in furrows	9
Common bardy vetch no. 34947	77
Common vetch no. 13427	100
Black bitter vetch	100
Horse bean	100
Crimson clover	30

Reference.—Georgia Experiment Station, Experiment, Ga. Unpublished data.

TABLE 16.—*Effects of crimson clover on yields of corn, Knoxville, Tenn., 1908–12*

Treatment	Yield corn bushels	Increased yield	Value of increase	Cost of clover	Estimated net returns
Check plot	30.8				
Crimson clover removed	41.8	11.0			
Crimson clover turned under	43.4	12.6			

Reference.—Tennessee Agricultural Experiment Station, Knoxville, Tenn. Bulletin 142, p. 4.

TABLE 17.—*The residual effect of winter cover crops on the yield of cotton at the Northeast Louisiana Experiment Station, St. Joseph, La.*

Cover crop	Yield of second crop of cotton following cover crop	Increase in yield of second crop of cotton	Yield of third crop of cotton following cover crop	Increase in yield of third crop of cotton	Value of increase	Cost	Estimated net returns
None, check	1,128		516				
None, 150 pounds nitrate of soda	1,366	238	1,038	522			
Austrian winter peas	1,323	195	855	339			
Oregon hairy vetch	1,563	435	992	476			
Monantha vetch	1,531	403	879	363			
Oregon common vetch	1,691	563	944	428			
Hungarian vetch	1,612	484	968	452			
Southern bur-clover	1,551	423	858	342			
Red clover	1,345	217	745	229			
Crimson clover	1,232	104					
Abruzzi rye	953	−175	481	−35			
Imported hairy vetch			849	333			
Melilotus indica			861	345			

Unpublished data.

TABLE 18.—*Effects from the use of cover crops on the yield of cotton at the Northeast Louisiana Experiment Station, St. Joseph, La.*

Cover crop	Yield of cover crop (pounds)	Yield of cotton	Increase in yield of cotton	Value of increase	Cost	Estimated net returns
None, check		1,038				
None, 150 pounds nitrate of soda		1,465	427			
Austrian winter peas	20,012	1,817	779			
Tangier peas	14,133	1,689	673			
Oregon hairy vetch	24,350	1,966	928			
Oregon Hungarian vetch	28,501	2,077	1,040			
Oregon common vetch	25,222	1,894	846			
Monantha vetch	34,121	2,152	1,114			
Oregon smooth vetch	23,558	1,939	901			
Purple vetch	13,034	1,627	612			
Southern bur-clover	17,655	1,917	880			
Melilotus indica	9,251	1,366	397			

Unpublished data.

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TABLE 19.—*Effects from the use of cover crops on the yields of cotton at the Louisiana Experiment Station, Baton Rouge, La.*

Cover crop	Fertilizer applied at rate of 600 pounds per acre on cotton	Cover crop yield,[1] tons per acre	3-year average yield seed cotton per acre 1931–33 (pounds)	3-year average increase in yield, 1931–35	Residual effect of cover crops on yields of seed cotton, pounds per acre	
					1934 (1 year)	1935 (2 years)
Rye	0-8-5	0.65	1,227	75	1,002	1,454
Oats	0-8-5	1.43	1,228	76	1,080	1,432
None	6-8-5		1,607	455	1,119	1,518
Melilotus indica, limed	0-8-5	11.73	1,665	513	[2] 1,410	1,655
Melilotus indica	0-8-5	5.62	1,608	456	1,239	1,556
Austrian winter peas	0-8-5	7.14	1,785	633	1,270	1,631
Hairy vetch	0-8-5	9.78	1,769	617	1,341	1,643
None, check	0-8-5		1,152		1,033	1,409

[1] 3-year average of 1931–33 except Melilotus, which is the average of 1931 and 1932.
[2] In the case of Melilotus indica, 1934 and 1935 cotton yields are in the second and third years, respectively, following the discontinuance of cover-crop planting.

Unpublished data.

Sources of other data that may be of value in teaching this phase of the unit are given below:

1. Winter legumes for soil improvement. North Carolina Agricultural Experiment Station, Raleigh, N. C. Circular 178, pages 1, 8, 9, 10.
2. Tennessee Agricultural Experiment Station, Knoxville, Tenn. Circular 45, page 2.
3. Coastal Plain Experiment Station, Tifton, Ga. Annual Report. Bulletin 24, page 34.
4. Small Grain Tests. Georgia Experiment Station, Experiment, Ga. Bulletin 149, page 32.

The experimental information along with the experiences of group should give a sound basis for deciding upon what kind of winter cover crop or crops to grow. This decision should now be made by the individual members of the group.

How much winter cover crop seed to procure?

(a) How much winter cover crop seed have members of the group been getting? Fill in following form or table and summarize.

Name of farmer	Amount per acre							
	Hairy vetch	Smooth vetch	Austrian peas	Monantha vetch	Crimson clover	Rye	Barley	Other

(b) How many seed per acre have the experiment stations found best to plant per acre? (See tables 20–23 inc.)

TABLE 20.—*Effects of rates of seeding and dates of cutting on yields of winter cover crops. Tifton, Ga., 1931–33*

Crop	Rates of seeding	Unit	Average yield green weight per acre, cutting date		Value of increase, cutting date		Increased cost, cutting date		Estimated net return, cutting date	
			Mar. 15	Apr. 1	Mar. 15	Apr. 1	Mar. 15	Apr. 1	Mar. 15	Apr. 1
Austrian peas	20	Pounds	4,242	5,308						
Do	30	do	5,192	6,350						
Do	40	do	5,426	6,356						
Do	50	do	5,418	6,207						
Do	60	do	5,748	6,496						
Hairy vetch	15	do	5,230	5,913						
Do	20	do	5,107	6,136						
Do	25	do	5,052	6,100						
Do	30	do	5,221	6,700						
Do	35	do	6,186	7,240						
Monantha vetch	20	do	6,024	7,733						
Do	25	do	6,240	7,590						
Do	30	do	6,355	8,100						
Do	35	do	6,553	8,080						
Do	40	do	6,977	9,393						
Smooth vetch	15	do	6,205	7,590						
Do	20	do	6,840	7,845						
Do	25	do	7,615	9,570						
Do	30	do	7,385	9,190						
Do	35	do	7,265	9,735						

TABLE 21.—*Yields of dry matter and nitrogen from different rates of seeding vetch. Experiment, Ga.*

Pounds of seed per acre	Yield		Increased yield		Value of increase	Cost	Estimated net returns
	Dry matter	Nitrogen	Dry matter	Nitrogen			
20	1,459	58					
30	1,833	73	374	15			
50	2,234	89	775	31			
60	2,457	98	998	40			
70	2,546	101	1,087	43			

Reference—Georgia Experiment Station, Experiment, Ga. Bul. 146, p. 197.

TABLE 22.—*Yield of winter cover crops sown at different rates. 1929–30. Georgia*

Crop	Pounds seed per acre	Yield		Value of yield		Cost	Estimated net returns
		Dry matter	Nitrogen	Dry matter	Nitrogen		
Austrian peas	10	3,960	118				
	20	5,229	155				
	30	6,835	203				
	40	8,405	205				
Hairy vetch	10	7,196	285				
	20	6,939	275				
	30	7,547	224				
	40	6,433	255				
Hungarian vetch	10	3,330	107				
	20	3,173	102				
	30	3,555	115				
	40	4,904	158				
Monantha vetch	10	4,991	157				
	20	5,968	188				
	30	4,991	157				
	40	6,402	201				
Smooth vetch	10	4,568	167				
	20	5,481	200				
	30	5,786	211				
	40	7,105	260				
Crimson clover	10	2,761	81				
	20	3,514	103				
	30	4,016	118				
	40	4,016	118				

Reference—Georgia Experiment Station, Experiment, Ga. Unpublished data.

TABLE 23.—*Effects of time and rate of planting winter cover crops on yields of green matter. Alabama, 1927–29*

Hairy vetch		Monantha vetch		Austrian peas	
Rate of seeding per acre, pounds	Yield, pounds	Rate of seeding per acre, pounds	Yield, pounds	Rate of seeding per acre, pounds	Yield, pounds
PLANTED SEPT. 30					
10	1,027	10	8,393	30	7,412
20	1,577	20	9,240	45	8,138
30	2,228	30	9,211	60	8,653
PLANTED OCT. 26					
10	791	10	5,308	30	4,747
20	1,682	20	6,949	45	5,658
30	1,893	30	7,700	60	6,931
PLANTED NOV. 23					
10	354	10	1,442	30	2,313
20	676	20	2,000	45	3,322
30	918	30	2,930	60	3,669
PLANTED DEC. 19					
10	None	10	594	30	855
20	None	20	947	45	1,393
30	None	30	1,312	60	1,562

Reference.—Alabama Experiment Station, Auburn, Ala. Bulletin 232, page 29.

Below are sources of other experimental information that may be of value in teaching this phase of the unit.

1. Coastal Plain Experiment Station, Tifton, Ga. Bulletin 23, pages 11–14, 22–25, and 27–30.
2. Extension Service of the Alabama Polytechnic Institute. The Digest, volume VII, page 12. 1930.
3. Alabama Experiment Station, Auburn, Ala. Bulletin 232, page 31.

The teacher should summarize this decision by leading the class to a definite conclusion relative to the kind and amount of seed of the several winter cover crops to procure, and this amount, times the number of acres to be planted, will give the quantity of seed needed for the class.

Where to get winter cover crop seed?

(a) Where do members of the group get winter cover crop seed? Fill out following form of table and summarize:

Name	Place procured	Kind of seed	Amount procured	Cost			Reliability of seedsman opinion
				Cost per pound	Other cost	Total cost per pound	

(b) Where can winter cover crop seed be procured? Fill out following form of table:

Seed dealers	Kind of seed	Percent germination	Cost per pound		Amount needed for group	Reliability
			Small amounts	Large amounts		
Local dealers						
1						
2						
3						
Other dealers						
1						
2						
3						

(c) Where and under what conditions are the several winter cover crop seed produced?

The teacher should be in a position to tell the group where the most important winter cover crop seed are produced, the social, economic, physical, and biological conditions under which they are produced and something of the transportation problems involved in getting the seed to the community.

From July 1, 1935 to March 31, 1936, 1,550,400 pounds of hairy vetch seed was imported into this country. These seed came from the following countries: 985,100 pounds from Hungary; 280,400 pounds from Japan; 189,900 pounds from Czechoslovakia; and 95,000 pounds from Germany.

Tell the group something of farming conditions in all foreign countries from which we import winter cover crop seed.

When to get winter cover crop seed?

(a) When do members of group get winter cover crop seed? Fill out following form of table.

Name	Date of buying	Price per pound	Planting date	Time money is available	Storage facilities	Distance from market

(b) What months in the year are winter cover crop seed cheapest? (See table 24.)

TABLE 24.—*Wholesale prices, by months, of certain winter cover crop seed, 1931–35. Wm. G. Scarlet Seed Co., Baltimore, Md.*

Name of cover crop	Price											
	Jan.	Feb.	Mar	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Hairy vetch	8.65	8.60	8.50	8.50	[1] 8.87	9.10	[1] 9.62	9.75	10.05	9.50	[1] 9.37	[1] 9.37
Common vetch	4.10	4.10	4.10	4.15	4.25	4.25	[1] 4.31	4.35	4.35	4.00	[1] 4.16	[1] 4.16
Austrian peas	5.00	4.80	4.80	4.80	[1] 5.00	[1] 5.00	[1] 5.12	5.10	5.10	5.05	[1] 5.12	[1] 5.12
Crimson clover	[1] 9.18	[1] 9.12	[1] 9.12	7.50	[1] 10.12	[1] 8.87	[2] 8.33	9.30	9.15	[1] 8.75	[1] 8.70	[1] 8.70
Monantha vetch	[4] 9.00	[4] 9.00	[4] 9.00	[4] 9.00	[4] 9.00	[4] 9.00	-----	[4] 6.00	[4] 6.00	-----	-----	-----
Abruzzi rye	[3] 1.50	[4] 1.15	[4] 1.15	[4] 1.15	[4] 1.10	-----	-----	[2] .91	1.03	1.05	[1] 1.06	[4] 1.15

[1] Average for only 4 years.
[2] Average for only 3 years.
[3] Average for only 2 years.
[4] Average for only 1 year.

(c) When will Government grants for soil building and soil conserving be available? (No information dealing with this question is available at present time. (June 1936).)

At this point, the whole program should be summarized: (1) What kind of seed have we decided to get? (2) How many seed are we to get? (3) Where are we going to get the seed? (4) When are we to get the seed?

UNIT 3.—PLANTING WINTER COVER CROP SEED

What land to plant in winter cover crops?

There are several important factors that should be given consideration in deciding upon what land to plant to winter cover crops. Perhaps those of major importance are: (1) Slope of land, (2) rotation system in vogue on the farm, (3) degree of erosion, (4) costs of seeding, (5) Government grants, and (6) type of soil.

The above factors should be placed on the board along with those suggested by the members of the group. The teacher should then raise the following questions:

(a) What lands do members of the group plant to winter cover crops? Fill out following form of table.

Name	Type of soil	Slope of land	Estimated increase yield		Rotation system in practice	Costs of seeding	Estimated net returns
			Cotton	Corn			

(b) What lands have experiment stations found best to plant in winter cover crops? (See table 1.)

TABLE 1.—*Effects of winter cover crops in controlling erosion, Athens, Ga.*

Treatment	Loss per acre (tons)		Years to erode 1 foot of soil	Estimated value of eroded soil	Estimated net returns from cover crops
	Soil	Water			
Wooded area	0.05	9	34,869		
Exposed subsoil	56.1	2,103	35		
Cover crop	.75	167	2,635		
Tilled, 3 inches	7.1	635	279		
Tilled, 6 inches	8.0	806	249		
Fallow	79.8	2,257	25		

Reference.—University of Georgia, College of Agriculture, Athens, Ga. Bul. 106.

TABLE 2.—*Effects of erosion on loss of plant food. Athens, Ga.*

Treatment	Loss of plant food per acre			Value of plant food				Cost of cover crop	Estimated net returns from cover crops
	Nitrogen	Phosphoric acid	Potash	Nitrogen	Phosphoric acid	Potash	Total		
	Lbs.	*Lbs.*	*Lbs.*						
Wooded area	1.5	1.7	1.6						
Exposed subsoil	74.6	863.9	191.2						
Cover crop	4.3	12.6	2.8						
Tilled, 3 inches	37.1	166.1	33.3						
Tilled, 6 inches	22.8	106.1	31.3						
Fallow	89.2	1,020.8	240.8						

Reference.—University of Georgia, College of Agriculture, Athens, Ga. Bul. 106.

Table 2 should be placed on the board and blank spaces filled out, based on current prices of fertilizers and costs of winter cover crop seed, etc.

TABLE 3.—*Loss of plant food from erosion in terms of commercial fertilizer carriers. Athens, Ga.*

Treatment	Loss of plant food per acre			Value of fertilizer lost			Cost of cover crop	Estimated net returns from cover crops
	Nitrate of soda —18 percent	Phosphoric acid —16 percent	Muriate of potash —50 percent	Nitrogen	Phosphoric acid	Potash		
	Pounds	*Pounds*	*Pounds*					
Wooded area	8	10	3					
Exposed subsoil	414	1,195	1,727					
Cover crop	24	25	17					
Tilled, 3 inches	210	206	332					
Tilled, 6 inches	126	195	212					
Fallow	495	1,500	2,141					

Reference.—University of Georgia, College of Agriculture, Athens, Ga. Bul. 106.

In table 3 the column on value, cost of cover crop and net returns should be filled in by class members. In connection with table 3, the teacher should make it plain that the loss of plant food is total loss and not in terms of available plant food.

Other experimental data dealing with this problem is found in unit 1, tables 1, 2, 3, 4, 5, and 7.

(c) What soil depleting crops may follow winter cover crops? See 1936 Agricultural Conservation Program, southern region, S. R. bulletin 1 revised, and S. R. leaflet 2.

(d) What soil conserving crops may follow winter cover crops? See reference in (c).

The teacher should now lead the group to a definite conclusion relative to land to plant in winter cover crops on the farms represented. This may result in the development of soil and rotation maps for each farm. Agricultural Education, Clemson College, South Carolina, volume 12, has excellent suggestions for farm mapping.

What method to use in planting winter cover crop seed?

(a) What methods are used by members of class in planting winter cover crop seed? Fill out the following form of table.

Name	Previous crop on hand	Drilled	Broadcast	Machinery for planting	Approximate cost	Yield	Estimated net returns

(b) What methods have experiment stations found best for planting winter cover crops? (See tables 4–6, inclusive.)

TABLE 4.—*Effects of method of planting winter crops on yields, Auburn, Ala.*

Plot mixture	Yield 1927–29		Cost of seeding		Value of hay		Estimated net returns	
	Broadcast	Drilled	Broadcast	Drilled	Broadcast	Drilled	Broadcast	Drilled
Oats Hairy vetch	1,883	2,055						
Oats Monantha vetch	2,653	1,810						
Oats Austrian peas	2,613	3,237						

Reference.—Alabama Polytechnic Institute, Auburn, Ala. The Digest, vol. VII, p. 12.

In connection with table 4 get the group to estimate costs of seeding and value of hay, and from these, net returns may be determined. These data may be worked out by all-day or part-time students prior to the opening of the evening class.

TABLE 5.—*Effects of methods of seeding winter cover crops on yield of green material, pounds. Alabama, 1927–29*

Planting date	Broadcast			Drilled		
	Vetch		Austrian peas	Vetch		Austrian peas
	Hairy	Monantha		Hairy	Monantha	
Sept. 30	2,393	8,613	5,186	3,100	10,492	6,905
Oct. 26	1,109	5,428	3,456	1,966	5,912	5,061
Nov. 23	442	1,890	1,928	852	3,063	3,216
Dec. 19	113	347	651	210	903	1,283

Reference.—Alabama Experiment Station, Anburn, Ala. Bulletin 232, p. 28.

TABLE 6.—*Effects of methods of planting winter cover crops on yields. Tifton, Ga., 1929–33*

Method of seeding	Average green weight yield per acre				Cost of different methods	Estimated net returns from different methods
	Austrian peas	Vetch				
		Hairy	Monantha	Smooth		
		Cut Mar. 15				
Drilled in	3,880	6,168	8,500	7,020		
Disked in	4,064	5,152	6,197	6,206		
Plowed in	5,496	5,644	7,432	6,933		
Harrowed in	3,684	4,136	5,228	4,899		
18-inch rows	4,316	5,156	5,760	4,180		
		Cut Apr. 1				
Drilled in	3,680	7,987	9,524	9,554		
Disked in	3,888	6,888	7,876	8,293		
Plowed in	5,155	8,092	9,428	9,420		
Harrowed in	4,464	5,556	6,492	7,140		
18-inch rows	5,056	6,476	7,844	6,220		

Reference.—Coastal Plain Experiment Station, Tifton, Ga. Bulletin 23.

How many winter cover crop seed to plant per acre?

Information dealing with this problem may be found in unit 2, tables 20–23, inclusive.

When to plant winter cover crop seed?

(a) When do farmers of the community plant winter cover crops? Fill out following form of table.

Name	Date of planting				Estimated yields			
	Austrian peas	Vetches	Crimson clover	Rye	Austrian peas	Vetches	Clovers	Rye

When the above local information has been tabulated, estimated costs, value, and net returns should be worked out with the group. Using estimated data from the farms represented, however, should lead the group to see the need for better and more comparable data.

(b) When have experiment stations found as the best time to plant winter cover crops? (See tables 7–9 inclusive.)

TABLE 7.—*Tifton, Ga., 1928–33*

Date of seeding	Average green weight, yield per acre				Costs of different seeding	Estimated net returns
	Austrian peas	Vetch				
		Hairy	Monantha	Smooth		
		Cut Mar. 15				
Oct. 1	7,438	9,812	11,072	9,900		
Oct. 15	6,749	7,966	9,963	8,595		
Nov. 1	4,293	3,660	7,480	5,470		
Nov. 15	1,787	2,038	3,217	2,535		
Dec. 1	726	947	890	745		
		Cut Apr. 1				
Oct. 1	8,472	15,112	13,404	11,720		
Oct. 15	7,876	12,016	11,940	11,205		
Nov. 1	5,687	6,636	12,070	8,025		
Nov. 15	3,060	3,936	7,496	3,870		
Dec. 1	1,487	2,107	3,573	1,665		

Reference.—Coastal Plain Experiment Station, Tifton, Ga. Bulletin 23.

TABLE 8.—*Effects of planting dates on yields of winter cover crops, Georgia, 1928–29*

Crop	Yield, pounds [1]			Value of yield			Cost			Estimated net returns
	Sept. 21	Oct. 6	Oct. 20	Sept. 21	Oct. 6	Oct. 20	Sept. 21	Oct. 6	Oct. 20	
Austrian peas	2,335	2,461	2,459							
Hairy vetch	2,308	2,344	2,305							
Hungarian vetch	2,565	2,629	2,202							
Monantha vetch	3,298	3,034	2,349							
Augusta vetch	1,251	1,407	1,415							
Crimson clover	3,008	2,863	1,685							

[1] Average of 4 cuttings—Mar. 20, Mar. 30, Apr. 10 and Apr. 20.

Reference.—Georgia Experiment Station, Experiment, Ga. Unpublished data.

TABLE 9.—*The effect of the date of planting and date of harvesting on yield of winter cover crops. Auburn, Ala., 1927–29*

Date of seeding	3-year average green weight, yield per acre, dates of harvesting				
	Mar. 10	Mar. 22	Apr. 2	Apr. 17	May 2
	Monantha vetch				
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Sept. 30	5,635	7,400	7,719	8,602	6,087
Oct. 26	5,245	5,408	6,027	6,596	5,000
Nov. 23	1,021	1,841	2,657	4,350	5,226
Dec. 19	255	373	670	1,393	2,090
	Austrian winter peas				
Sept. 30	4,728	5,909	6,996	9,436	7,515
Oct. 26	2,846	4,265	5,948	8,724	7,116
Nov. 23	978	1,545	2,372	4,548	4,745
Dec. 19	319	426	761	1,756	2,446
	Hairy vetch				
Sept. 30	2,581	2,311	2,377	2,023	1,539
Oct. 26	1,569	1,633	1,792	2,136	2,072
Nov 23	263	415	630	888	1,001
Dec. 19	82	119	160	274	344

Reference.—Alabama Experiment Station, Auburn, Ala. Bulletin 232.

TABLE 10.—*Yield of winter cover crops as influenced by the rate of seeding. Georgia, 1928–29*

Crop [1]	Pounds of seed per acre				Value of yield				Cost				Estimated net returns
	10	20	30	40	10	20	30	40	10	20	30	40	
	Yield		*Pounds*										
Austrian peas	2,020	2,320	2,448	2,886									
Hairy vetch	2,042	2,267	2,395	2,569									
Hungarian vetch	1,956	2,624	2,621	3,115									
Monantha vetch	2,409	3,067	3,201	3,188									
Augusta vetch	1,219	1,524	1,314	1,383									
Crimson clover	2,045	2,584	2,674	2,811									

[1] The yields are average of four cutting dates, Mar. 20, Mar. 30, Apr. 10, and Apr. 20.

Reference.—Georgia Experiment Station, Experiment, Ga. Unpublished data.

Summarize the whole problem by listing upon the blackboard the decisions that have been made by the class.

Other references containing information relative to this whole problem are as follows:

1. Alabama Agricultural Experiment Station, Auburn, Ala., Bulletin 232, pages 15, 19, and 25.
2. Tennessee Agricultural Experiment Station, Knoxville, Tenn., circular no. 52.

UNIT 4.—FERTILIZING WINTER COVER CROPS

What fertilizer to use with winter cover crops?

There are several factors that should be considered in deciding upon the kind and amount of fertilizer to use with winter cover crops. The more important factors are: (1) cost, (2) increased yield, (3) available money, (4) Government grants, and (5) net returns.

After these have been brought to the attention of the group and discussed, the teacher should ask the following questions:

(a) What fertilizers do the members of the class use on winter cover crops? Fill out the following form of table:

Name	Winter cover crop planted	Cost of fertilizer	Amount			Carriers			Value of increased yield	Estimated net returns
			Nitrogen	Phosphoric acid	Potash	Nitrogen	Phosphoric acid	Potash		

(b) What kind and how much fertilizer has given best results on winter cover crops at the experiment stations?

There are several tables (see tables 1–8 inclusive) giving information from the experimental stations in the South. These data should be placed on charts or blackboards as a basis for discussion. Estimated values, costs, etc., should be made from local information by members of the class.

TABLE 1.—*Effect of superphosphate on the green weight yields of winter cover crops, Gainesville, Fla.*

AUSTRIAN PEAS

Fertilizer treatment per acre	Yield on 6 farms [1] (tons)	Cost of treatment	Value of increased yield	Estimated net returns
0 pound superphosphate	2.3			
300 pounds superphosphate	5.8			
600 pounds superphosphate	5.8			

[1] Farms located in Jackson and Washington Counties.

TABLE 1.—*Effect of superphosphate on the green weight yields of winter cover crops, Gainesville, Fla.*—Continued

MONANTHA VETCH

Fertilizer treatment per acre	Yield on 6 farms (tons)	Cost of treatment	Value of increased yield	Estimated net returns
0 pound superphosphate	1.9			
300 pounds superphosphate	4.1			
600 pounds superphosphate	4.4			

HAIRY VETCH

0 pound superphosphate	2.0			
300 pounds superphosphate	3.8			
660 pounds superphosphate	4.0			

Reference.—Florida Experiment Station, Gainesville, Fla. Annual Report, 1930

TABLE 2.—*Effects of lime on yields of vetch and yellow melilotus. Auburn, Ala.*

Fertilizer treatment	Legume crop	Yield, green weight	Cost of treatment	Value of increased yield	Estimated net returns
400 pounds superphosphate, 50 pounds muriate of potash	Vetch	7,418			
400 pounds superphosphate, 50 pounds muriate of potash	Annual yellow melilotus.[1]	None			
400 pounds superphosphate, 50 pounds muriate of potash, 2 tons lime [2]	Vetch	8,157			
400 pounds superphosphate, 50 pounds muriate of potash, 2 tons lime [2]	Annual yellow melilotus.	5,537			
400 pounds basic slag, 50 pounds muriate of potash, ½ ton basic slag [1]	Vetch	8,080			
400 pounds basic slag, 50 pounds muriate of potash, ½ ton basic slag [1]	Annual yellow melilotus.	2,648			

[1] When plots 5 and 6 were limed.
[2] Lime every 5 years.

Reference.—Alahama Agricultural Experiment Station, Auburn, Ala. Bul. 232

TABLE 3.—*Effects of superphosphate, ground limestone, and stable manure on yields of winter cover crops. Auburn, Ala.*

Treatment	Pounds	Average yield 7 crops	Value	Cost	Estimated net returns
Check		4,088			
Superphosphate	400	9,597			
Superphosphate, Ground limestone	400, 4,000	13,499			
Superphosphate, Ground limestone	400, 4,000	17,699			
Manure	6 tons				

Reference.—Alahama Experiment Station, Auburn, Ala. Bul. 232, p. 22.

TABLE 4.—*Comparative yields of winter cover crops on limed and unlimed land. Calhoun, La.*

Crop	Yield, tons		Value of yield	Total cost	Estimated net returns
	Limed	Unlimed			
Bur clover	3.0	1.6			
Austrian peas	9.9	8.0			
White Dutch clover	7.4	6.2			
Melilotus alba	5.8	2.3			
Red clover	3.2	2.8			
Monantha vetch	14.5	12.4			
Hairy vetch	15.0	11.5			
Rye	3.8	3.8			
Oats	4.3	3.8			

Reference.—North Louisiana Experiment Station, Calhoun, La. Annual Report, 1931, p. 16.

TABLE 5.—*Effects of superphosphate on yields of vetch and Austrian peas. Experiment, Ga., 1928–32*

Treatment	Air dried hay in pounds per acre	Increased yield	Value of increase	Cost	Estimated net returns
None	452				
87 pounds superphosphate	768	316			
175 pounds superphosphate	1,105	653			
262 pounds superphosphate	1,491	1,039			
350 pounds superphosphate	1,835	1,383			
437 pounds superphosphate	1,717	1,265			

Reference.—Georgia Experiment Station, Experiment, Ga. Annual Report, 1932, p. 23.

TABLE 6.—*Residual effects of different rates of fertilizer on vetch. Experiment, Ga.*

Treatment	Pounds dry matter	Increased yield	Value of increase	Cost	Estimated net returns
No fertilizer	608				
200 pounds 8–3–3	2,198	1,590			
400 pounds 8–3–3	2,658	2,050			
600 pounds 8–3–3	2,926	2,318			
800 pounds 8–3–3	4,026	3,418			

Reference.—Georgia Experiment Station, Experiment, Ga. Bul. 146, p. 200.

TABLE 7.—*Residual effects of phosphates on yields of vetch and corn. Experiment, Ga.*

Treatment [1]	Weight of dry vetch	Yield of corn, bushels	Value		Total value	Cost	Estimated net returns
			Vetch	Corn			
No fertilizer	1,212	29					
No phosphate	1,351	31					
400 pounds acid phosphate	3,142	42					
400 pounds rock phosphate	3,053	41					

[1] All plots, except no fertilizer plots, received 24 pounds of ammonia and 24 pounds of potash per acre.

Reference.—Georgia Experiment Station, Experiment, Ga. Bulletin 146, p. 198.

TABLE 8.—*Residual effects of different rates of potash on vetch. Experiment, Ga.*

Treatment	Yield, dry weight	Increased yield	Value of increase	Cost	Estimated net returns
No fertilizer	174				
600 pounds 8–3–0	2,747	2,573			
600 pounds 8–3–3	2,626	2,452			
600 pounds 8–3–6	3,152	2,935			
600 pounds 8–3–9	3,063	2,889			

Reference.—Georgia Experiment Station, Experiment, Ga. Bulletin 146, p. 199.

From the selected experimental data (tables 1–8, inclusive), lead the group to decide upon the kind, amount, and carriers of fertilizer to use on winter cover crops. Each farmer should be encouraged to make a list of fertilizers for his farm.

(c) What fertilizers will the agricultural conservation program assist farmers to purchase for winter cover crops? (Check with latest available publications for region.)

Practice	Rates and conditions
1. Application of ground limestone or its equivalent.[1]	When applied according to practices approved by the State agricultural conservation committee on soil-conserving crops or pasture between Jan. 1, 1936, and Oct. 31, 1936.
Rate of application:	Rate of payment per acre:[2]
Not less than 1,000 pounds per acre	$0.70.
Not less than 2,000 pounds per acre	$1.40.
Not less than 3,000 pounds per acre	$2.10.
Not less than 4,000 pounds per acre	$2.80.
2. Application of 16 percent superphosphate or the equivalent.[3]	When applied according to practices approved by the State agricultural conservation committee on soil-conserving crops or pastures excluding soybeans, cowpeas, velvet beans, peanuts and annual grasses.
Rate of application:	Rate of payment per acre:
Not less than 100 pounds per acre	$0.50.
Not less than 200 pounds per acre	$1.00.
Not less than 300 pounds per acre	$1.50.
Not less than 400 pounds per acre	$2.00.
Not less than 500 pounds per acre	$2.50

[1] The equivalent of 1,000 pounds of ground limestone would be considered as 600 pounds of burnt lime or 700 pounds of hydrated lime.

[2] In counties designated by the State committee and approved by the Secretary a higher rate per acre may be paid if recommended by such committee and approved by the Secretary.

[3] (a) If fertilizer material containing a different analysis than 16 percent of P_2O_5 were used, the rate of payment per 100 pounds would vary proportionately. Example: If the 48 percent superphosphate were used, the payment would be 3 times the rate specified, or $1.50 per 100 pounds.

(b) If fertilizer material containing a different analysis than 16 percent of P_2O_5 were used, the rate per acre of the application would vary proportionately. Example: For 48 percent superphosphate, one-third of the quantity specified for 16 percent P_2O_5 would be required.

Soil-building payments for the practices set forth will not be made when the labor, seed, or material are furnished or paid for by any State or Federal agency.

When to procure fertilizer for winter cover crops?

In deciding when to get fertilizer for winter cover crops, consideration should be given the following factors: (1) cost at different seasons of the year, (2) planting time, (3) available money, and (4) storage facilities.

(a) When do farmers of the class get fertilizer for winter cover crops? Fill out following form of table.

Name	Purchased	Facilities	Planting	Financed	Cost

(b) What time of the year is fertilizer cheapest?

Obtain from local and other dealers the prices of fertilizers at the four seasons of the year. Fill out following form of table.

Dealers	Prices				Interest cost	Storage cost	Total cost
	Fall	Winter	Summer	Spring			
1 Local							
2 Other dealers							

(c) When will money for buying fertilizer for winter cover crops be available from agricultural conservation program? (Information not available when this material was prepared.)

Where to procure fertilizers for winter cover crops?

Keep in mind the following points in deciding where to get fertilizers: (1) cost, (2) credit arrangements, and (3) reliability of dealer.

(a) Where do members of the group get fertilizers for winter cover crops? Fill out following form of table.

Name	Where bought 1935	Credit arrangements	Cost

When the above has been summarized, a list of all local fertilizer dealers should be placed on board, along with prices and credit facilities. The prices may then be compared and reliability of dealers discussed.

The teacher should now summarize the whole problem by writing upon the blackboard the group answers to the following questions: (1) What fertilizer to get? (2) When to get fertilizer? and (3) Where to get fertilizer for winter cover crops?

UNIT 5.—INOCULATING WINTER COVER CROPS

There is very little experimental data on inoculating winter cover crops. The teacher should use the experiences of the class members, along with personal observations and statements from experts. Quotations from specialists in this field are given in this unit.

What winter cover crop seed to inoculate?

(a) What winter cover crop seed do members of class inoculate? Fill out following form of table.

Name	Kind of crop inoculated	Estimated increased yield	Cost of inoculation	Estimated net returns

(b) What winter cover crop seed have experiment stations found best to inoculate?

J. L. Stephens of the Georgia Coastal Plain Experiment Station says:

> Only certain strains of bacteria will live on a particular legume, making it necessary to inoculate with the right bacteria to get satisfactory results. Winter peas and vetch are inoculated by the same organism.
>
> Inoculation must be supplied in the Coastal Plain for most, if not all, winter legumes, if satisfactory results are to be obtained. Land that has recently grown winter peas or vetch successfully does not need inoculating, as the bacteria are already in the soil.

G. A. Hale, Department of Agronomy, Georgia Experiment Station, Experiment, Ga., makes the following statement relative to inoculating legumes:

> Nitrogen is the only fertilizer element which legumes can add to the land and nitrogen cannot be assembled from the air and fixed by the plants unless they are inoculated with certain bacteria or organisms which enter the roots and form nodules. One strain of these organisms will grow only on one group of the legume crops, while other strains grow on other groups. Austrain peas and the vetch require the same inoculation, while all of the true clovers such as bur, subterranean, crimson and white clovers are inoculated by another kind of organism.
>
> If no legume of the same inoculation group as the one to be planted has been grown on the land during the past year, then the seed or land both should be supplied with the bacterial inoculation.

How to inoculate winter cover crop seed.

(a) What methods do members of group use in inoculating legumes?

Name	Method	Results	Cost

(b) What methods do experts suggest?

On land where these crops have not been grown recently, inoculation may be obtained by using soil from a field that has grown these crops successfully. About 200 to 500 pounds of soil per acre should be used and worked into the land. If left exposed to drying and sunlight, the bacteria may be killed. Mixing a little soil with the seed at time of planting also has been found effective.

Several firms manufacture commercial inoculum or cultures. Directions for use and date of preparation are given on the labels. It is important to use fresh cultures and these should be used within the time specified on the package. Such cultures should be kept in a cool place and out of sunlight. Commercial cultures have proved very satisfactory and are easily applied.

A handy way to inoculate seed is to dissolve the inoculating material in a small amount of water; put about one-half bushel of seed into a three to five bushel sack, and pour in a small amount of the dissolved inoculating material. The open end of the sack is then gathered in one hand and the bottom end of the sack in the other, distributing the inoculating material by raising one end of the sack and then the other. This should be done until all the seed are moist. As wet seed do not feed through a grain drill freely, it is necessary to let the seeds set for about 1 hour before putting them in the grain drill. For best results, seed should be inoculated on the same day it is planted. Inoculated seed should be kept in the shade.[1]

This (inoculation) may be done by using an artificial culture—follow directions on container—on seed, by using soil from a known inoculated field on the seed or by using both of these methods. As a rule, broadcasting and harrowing in or drilling in from 100 to 500 pounds per acre of well inoculated soil with the seed is the best way to inoculate winter legumes.[2]

Suggestions for inoculating legumes are also found in the following bulletins:

(1) West Virginia Agricultural Experiment Station, Morgantown, W. Va. Bulletin 105.

(2) Mississippi Agricultural Experiment Station, State College, Miss. Bulletin 63.

(3) Missouri Agricultural Experiment Station, Columbia, Mo. Bulletin 282.

TABLE 1.—*Analysis of failures with winter legumes grown on Louisiana farms, 1929–32*

Cause of failure	Austrian peas	Hairy vetch	Peas and vetch	Peas or vetch with oats	Hungarian vetch	Bur clover	Melilotus indica
	Farms	*Farms*	*Farms*	*Farms*	*Farms*	*Farms*	*Farms*
Late planting	10	2	0	0	3	1	2
Poor drainage	12	4	1	2	0	0	3
Poor inoculation	12	1	0	0	2	0	0
Improper planting	12	2	2	2	2	0	0
Heavy grazing	13	4	0	1	2	0	1
Winter killed	10	1	1	0	0	0	15
Wet winter and spring	7	1	1	1	0	0	0
Unsuitable soil	0	0	0	0	0	0	1
Poor land, no phosphate and potash	1	0	0	0	0	0	0
Dry fall	0	1	0	0	1	0	0
Farms reporting	134	41	17	5	15	8	44

Reference.—Louisiana Agricultural Experiment Station. Bulletin 155, pp. 5 and 6. Baton Rouge, La.

From table 1 it may be pointed out that poor inoculation is the cause of a relatively high percentage of failures, especially in Austrian peas.

Following the discussion of this problem, the teacher should take the class to some farm and teach the operative aspect of the job.

UNIT 6.—TURNING UNDER WINTER COVER CROPS

Materials and suggested methods for teaching this job are included in this insert; however, it is not expected that the problem will be considered until February or March 1937.

What winter cover crops to turn under?

Focus the thinking of the group on such factors as: Effect on yield of following crop, value of crop, cost of turning under, and net returns. With these guides in mind, raise the questions listed below.

(a) What winter cover crops do members of the class turn under?

Place an outline table on board and get the information from group.

Name	Cover crop grown	Date turned under

(b) What winter cover crops have experiment stations found best to turn under?

Information dealing with this aspect of the problem is found in tables 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 16, 17, 18, and 19 of unit 2. The teacher should select the most appropriate tables from the above group and present them as a basis for deciding what cover crops to turn under.

[1] Georgia Coastal Plain Experiment Station, Tifton, Ga. Bulletin 23, pp. 6 and 7.

[2] Georgia Experiment Station, Experiment, Ga. Unpublished data.

(c) What winter cover crops will agricultural soil conservation program pay for turning under?

See unit 2. Make a list of these crops and practices on the board for discussion.

When to turn under winter cover crops?

There are several important economic factors that should be kept in mind in deciding when to turn under winter cover crops: Type of soil, kind of machinery, crop to follow, yield, and cost. These factors should become guide posts in answering the following questions:

(a) When do members of the group turn under winter cover crops? Fill out following form of table.

Name	Kind of cover crop	Date turned under	Increased yield of following crop	Kind of plow used	Cost per acre

Summarize the above data by getting the group to answer the following questions: (1) What kind of plow is best for turning under cover crops at different dates? (2) How long should cover crops be plowed under prior to planting corn? Cotton? Summer legumes? (3) What is the supply of labor for turning under on different dates?

(b) When does agricultural conservation program suggest turning under cover crops?

S. R. Bul. No. 2 or information from unit 2. (Check with latest publication.) The information should be listed on the board and studied so that each farmer may know the conditions of payment for soil-building practices.

(c) When have southern experiment stations found best to turn under winter cover crops?

Tables 1 to 8, inclusive, provide data from several stations. The teacher should select information from stations with similar soil and climatic conditions to those existing in the local community.

TABLE 1.—*Effect of planting and harvesting dates on yield of Austrian winter peas, pounds per acre. South Carolina*

Date of planting	Dry matter		Nitrogen		Total value of yield		Cost	Estimated net returns
	Apr. 30	May 14	Apr. 30	May 14	Apr. 30	May 14		
Oct. 1	5,314							
Oct. 22	4,007	5,662	140	198				
Nov. 1	4,029	4,356	141	152				
Nov. 15	3,158	5,118	110	179				
Dec. 5	1,524	3,775	53	132				

Reference.—South Carolina Experiment Station, Clemson, S. C. Circular 37, p. 9.

TABLE 2.—*Effect of harvesting dates on yield of different cover crops. South Carolina*

Crop	Yield, dry weight		Value		Cost	Estimated net returns
	Apr. 23	May 14	Apr. 23	May 14		
Austrian peas	5,314	4,029				
Hairy vetch	4,872	5,662				
Hungarian vetch	5,270	4,773				
Monantha vetch	2,878	2,286				
Canadian field peas	4,617	2,613				
Crimson clover	7,971	5,227				
White sweet clover	2,695	2,395				
Yellow sweet clover	2,918	4,420				
Red clover	4,704	4,138				
Melilotus	4,878	4,573				

Reference.—South Carolina Experiment Station, Clemson, S. C. Cir. 37, p. 6.

TABLE 3.—*Effect of dates of cutting hairy vetch on yield of dry matter and nitrogen in tops. Experiment, Ga., 1926*

Date cut	Yield, pounds		Value [1]		Total value	Cost	Estimated net returns
	Dry matter	Nitrogen	Dry matter	Nitrogen			
Mar. 26	624	26.6		$5.32			
Apr. 2	795	28.5		5.70			
Apr. 9	1,057	46.8		9.36			
Apr. 16	1,271	56.7		11.34			
Apr. 23	2,419	108.6		21.72			
Apr. 30	3,312	127.9		25.58			

[1] Nitrogen valued at 20 cents per pound.

Reference.—Georgia Experiment Station, Experiment. Ga. Bul. 146, p. 189.

TABLE 4.—*Effect of dates of cutting hairy vetch on yields of dry matter and nitrogen in roots and tops. Experiment, Ga. 1926*

Date	Yield, pounds		Value		Total value	Cost	Estimated net returns
	Dry matter	Nitrogen	Dry matter	Nitrogen			
Mar. 25	937	39.9					
Apr. 2	1,193	42.7					
Apr. 9	1,587	70.2					
Apr. 16	1,906	85.0					
Apr. 23	3,618	162.4					
Apr. 30	4,969	191.8					

Reference.—Georgia Experiment Station, Experiment, Ga. Bul. 146, p. 192.

TABLE 5.—*Effect of dates of harvesting crimson clover on yields of dry matter and nitrogen in roots and tops. Experiment, Ga., 1926*

Date	Yield, pounds		Increased yield		Total value	Cost	Estimated net returns
	Dry matter	Nitrogen	Dry matter	Nitrogen			
Mar. 26	2,511	110					
Apr. 2	3,150	124	639	14			
Apr. 9	3,970	167	1,459	57			
Apr. 16	5,802	233	3,291	123			
Apr. 23	7,381	238	4,870	128			
Apr. 30	7,692	223	5,181	113			

Reference.—Georgia Experiment Station, Experiment, Ga. Bul. 146, p. 196.

TABLE 6.—*Yield of dry matter and nitrogen per acre of winter cover crops cut on different dates. Experiment, Ga., 1927–28*

Crop	Date cut	Yield, pounds		Value		Cost	Estimated uet returns
		Dry matter	Nitrogen	Dry matter	Nitrogen		
Austrian peas	Apr. 11	1,425	54				
	Apr. 21	1,766	62				
	May 1	3,077	102				
	May 10	3,936	125				
Hairy vetch	Apr. 11	2,039	72				
	Apr. 21	1,463	47				
	May 1	1,733	72				
	May 10	1,829	72				
Hungarian vetch	Apr. 11	2,700	100				
	Apr. 21	2,745	88				
	May 1	2,380	89				
	May 10	2,470	93				

Reference.—Georgia Experiment Station, Experiment, Ga. Unpublished data.

TABLE 7.—*Effect of dates of harvesting winter cover crops on yield (green weight). Tifton, Ga., 1926–33*

Crop	Date		Increased yield	Value of increase	Cost	Estimated net returns
	Mar. 1	Mar. 15				
Austrian peas	11,498	13,076	1,578			
Hairy vetch	8,082	10,889	2,807			
Monantha vetch	15,787	18,289	2,502			
Abruzzi rye	5,522	7,445	1,923			

Reference.—Georgia Coastal Plain Experiment Station, Tifton, Ga. Bul. 23, p. 33.

TABLE 8.—*Effect of different dates of plowing under winter cover crops on yields of corn. Tifton, Ga., 1931–33*

Date	Yield, corn, bushels	Increased yield, busbels	Value of increase	Cost	Estimated net returns
Feb. 1	40.3				
Feb 15	43.9	3.6			
Mar. 1	44.2	3.9			
Mar. 15	45.6	5.3			
Apr. 1	43.8	3.5			
Apr. 15	36.4	−3.9			

Reference.—Georgia Coastal Plain Experiment Station, Tifton, Ga. Bul. 23, p. 39.

Other data that may be used here are found in tables 8 and 17 of unit 2, and tables 6, 7, 8, and 9 of unit 3.

Summarize the problem by listing on the board the winter cover crops that should be turned under, and then have the group suggest the best date for turning under.

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